CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 23, 2018

FILE REF: 3320

TO: **Wisconsin Licensed Well Drillers**

FROM: Liesa Lehmann, Private Water Supply Section Chief
Bureau of Drinking Water and Groundwater

SUBJECT: **MODIFICATION TO SPECIAL WELL CASING PIPE DEPTH AREAS # 79a and 79b, Outagamie County (entire county) and Winnebago County (entire county)**

Special Well Casing Pipe Depth Areas #79a and 79b are hereby modified for Outagamie and Winnebago Counties as described in detail below. This modification provides a second option for cement grout curing, allowing a shorter grout cure time if specified accelerant is used.

EFFECTIVE DATE: This modification to Special Well Casing Pipe Depth Areas #79a and 79b is effective March 26, 2018.

LOCATION

This modification applies to existing Special Well Casing Pipe Depth Areas #79a and 79b, which apply in the entire land areas of Outagamie and Winnebago County.

JUSTIFICATION

The establishment of this "Special Well Casing Pipe Depth Area" is based on the potential that new wells constructed in this area to minimum Private Well Code (NR 812) specifications would be at significant risk to arsenic contamination. The drilling and construction specifications have been very successful at reducing incidence of wells producing water over the arsenic standard of 10 ppb. Recently the department was petitioned to consider allowing use of a cement accelerant and allowing less than 24 hours of set time before drilling the lower borehole. Since neat cement (with 2% bentonite) develops a compressive strength of 1090 psi at 24 hours and with 2% calcium chloride the strength is 1805 psi at 18 hours, the Department has modified requirement #8 below to allow this option.

NEW WELL CONSTRUCTION, GROUTING AND DISINFECTION SPECIFICATIONS

Within this "Special Well Casing Pipe Depth Area", private wells shall be constructed with alternate construction methods and more stringent specifications for construction, grouting and disinfection. Any new well construction, or existing well reconstruction, within this area on or after the effective date shall be constructed, cement-grouted and disinfected to the following specifications:

1. For 6-inch diameter wells, the upper-enlarged drillhole shall have a minimum diameter of 8 ¾ inches rather than the minimum 8-inch diameter. For larger diameter wells, the upper-enlarged drillhole shall be at least 2 inches larger in diameter than the nominal diameter of the permanent well casing pipe.
2. The upper-enlarged drillhole shall be constructed using rotary mud-circulation methods or cable-tool methods. Rotary-air methods may **not** be used for this purpose.

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The size of the mud pit shall have a volume large enough to provide for efficient removal of drill cuttings. Further, a centrifuge sand separator shall be installed with the mud circulation system to help remove sand-sized drill cuttings that may contain arsenic-laden sulfide minerals.

3. Water used to mix the drilling mud slurry shall have a pH between 7 and 8.5. If the pH is below 7, it shall be slowly treated with soda ash to achieve a pH within this range.
4. The cement grout shall be ordered from a commercial concrete company, shall be ordered free of aggregate, and shall have a slurry density of at least 15.2 lbs./ gallon, but preferably should have a density of 15.6 lbs./gal. The grout density shall be measured with a mud balance at the well site.
5. The grout shall be adequately screened to remove any unexpected aggregate before it enters the grout pump hopper.
6. The cement grout shall be pumped into the annular space using either the "Bradenhead" or the "Grout Shoe" method and the grouting operation shall be done in a manner according to the requirements of s. NR 812.20.
7. At completion of the grouting procedure, the grout shall flow out the top of the annular space with the same density as the grout being pumped from the hopper and shall have a density of at least 15.2 lbs./gal. The grout density shall be measured with a mud balance.
8. The cement grout shall be allowed to set for at least 24 hours before the construction of the lower bedrock drillhole is commenced. **If the cement is mixed with 2% calcium chloride the lower drillhole work can begin at 18 hours.**
9. To avoid introduction of air (and oxygen) into the aquifers, the lower open bedrock drillhole shall be constructed using rotary-mud or "rotary-wash" drilling methods, i.e. rotary water-circulation methods. Rotary-air methods may **not** be used for this purpose. As an alternative, the lower drillhole may be constructed using cable-tool methods or with other drilling methods provided they do not inject air into the aquifer and are approved by the Department.
10. Upon completion of the well, an approved additive-free liquid chlorine (sodium hypochlorite) product shall be used to disinfect the well. Dry calcium hypochlorite products (granular or pellet type) shall not be used. The chlorine solution shall not have a concentration greater than 100 milligrams per liter (mg/l), and there shall be no more than 30 minutes of contact time in the well. After this time has elapsed, the solution shall be thoroughly flushed out of the well with water, not with air.